

From Dating Ancient Artifacts to Revolutionizing Biological Science: Applications of a Powerful Nuclear Physics Technology

John P. Knezovich, Ph.D.
Director, Center for Accelerator Mass Spectrometry
Lawrence Livermore National Laboratory

Accelerator mass spectrometry (AMS) is an exceptionally sensitive technique for measuring concentrations of specific isotopes (e.g., carbon-14) in relatively small (< 1mg) samples. This technique is most commonly used to carbon date items of historical or anthropological interest. Because AMS can be used to detect one carbon-14 atom in a quadrillion other carbon atoms, researchers can also address a variety of unique applications in environmental and biological research that would otherwise not be possible. For example, carbon-14 measurements are being used to assess the frequency of earthquakes and climate-induced changes in ocean circulation. Due to its high sensitivity, AMS also permits the uptake and metabolism of chemicals to be traced directly in humans. This approach is revolutionizing the fields of nutrition, toxicology and pharmacology by eliminating the uncertainty associated with animal models. At LLNL, the Center for AMS (CAMS) is the most versatile and productive facility of its kind in the world. In this presentation, advances in several scientific disciplines that have been made possible by AMS will be discussed.

Dr. John Knezovich has been the director of the Center for Accelerator Mass Spectrometry at the Lawrence Livermore National Laboratory (LLNL) since May of 1998. He was previously a group leader for Environmental Chemistry and Toxicology in the Health and Ecological Assessment Division. Dr. Knezovich is an environmental chemist who has extensive experience in the design and application of experimental approaches for determining the fate, transport and toxicity of contaminants in the environment. He received his B.A. in biological science from the University of the Pacific and his Ph.D. in chemical ecology from UC Davis. Dr. Knezovich serves on UC, state and federal advisory panels that oversee research on toxic substances and has more than 60 scholarly articles and publications.